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research update

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Research and Statistics Branch

The current number of *Research Update* presents new findings on two topical aspects of development economics: investment in infrastructure and productivity and the dynamics of internationalization. It goes on to highlight a unique gathering of future economists and, in the personal perspectives column, ventures into the expanding realm of metadata.

A UNIDO presentation at the National Bureau of Economic Research's 2007 Summer Institute reveals that the success of investment in industrial infrastructure and productivity enhancement rests critically on a country's stage of development. Invited to participate in this prestigious event for the second consecutive year, the Organization has focused, once more, on a facet of the dynamics that account for variations in economic growth and development between nations.

For the first time, multinational enterprises from the Association of Southeast Asian Nations (ASEAN) are examined in the three dimensions of strategic coherence, dispersed functionality and global industrial restructuring, in an article co-authored by researcher Frank Bartels, from the Research and Statistics Branch (RST). Published in the *ASEAN Economic Bulletin*, the study maps the business dynamics that can help guide developing countries in attracting foreign investment from ASEAN firms.

Emerging from UNIDO's first expert group meeting for ten promising young economists are a host of fresh approaches to industry-related challenges. The presentations range from such diverse issues as spillovers from multinationals and limitations of corporate social responsibility through networking for small businesses and quantifying national systems of innovation to trade performance gains and the effect of tariff reductions on productivity.

If the term "metadata" sends the uninitiated scurrying for their dictionaries, the Chief of UNIDO's Statistics Unit, Tetsuo Yamada, puts this increasingly important aspect of data collection into perspective. Hand-in-hand with the growing demand for specialized and detailed industrial statistics, he outlines the role of metadata in bridging the gaps between national and international standards of statistical recording.

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UNIDO at the forefront of economic research, *by Anders Isaksson*

While investment in infrastructure is crucial for industrial development and productivity enhancement, its success rests on an equally crucial factor, according to RST economist Anders Isaksson and University of Maryland economist Charles Hulten. In their presentation to the National Bureau of Economic Research (NBER) 2007 Summer Institute, in Cambridge, Massachusetts, they argued that the appropriate kind of infrastructure in which to invest and the returns from doing so critically depend on the stage of development of a country at the time of investment.

NBER's annual gathering attracts some 1,200 economics researchers from universities around the world, though mainly from the United States. Occasionally, researchers from international organizations, such as World Bank, International Monetary Fund (IMF) and Organisation for Economic Co-operation and Development (OECD) are invited to participate. During the past two years, UNIDO has contributed to the deliberations of this event with its findings on productivity.

Organized by topic, the month-long Institute covers economic areas ranging from monetary economics, political economy and industrial organization through aging and health economics to econometrics and productivity. Each topic forms a workshop that presents, for example, novel research angles, new empirical methods or, at times, even the research agenda for some years to come. This cutting-edge conference constitutes, in effect, a proving ground for the latest research work, by subjecting it to the highest level of academic scrutiny.

In 2006, UNIDO's paper, *Why Income Levels Differ: The Sources of Different Economic Growth in a Panel of High and Low Income Countries*, showed that cross-country income differences overwhelmingly were due to gaps in total factor productivity (TFP), rather than differences in capital deepening. That was an important finding in that it identified the relevant policy area for sustained economic growth. Besides its significance for economic thinking, the paper was particularly relevant for UNIDO's activities by highlighting that industrial development, as a main source of productivity growth, was imperative for economic development and, hence, poverty reduction.

The 2007 UNIDO contribution, *Infrastructure and Productivity at Different Stages of Development*, built on last year's paper. Based on data for 112 countries from 1970 to 2000, Messrs. Isaksson and Hulten show that infrastructure is a powerful predictor of countries' productivity performance and, hence, of cross-country income differences. The 2007 paper reveals that the stage of development– essentially industrial– impacts on the degree to which infrastructure influences productivity. The main conclusion is that investment in infrastructure remains vital for any industrialization endeavor in developing countries where the initial stock of infrastructure is relatively low. Related to this, the authors stress that different kinds of infrastructure are important at different stages of development. For example, whereas the (marginal) return on investment in road connections between rural and urban areas is much higher in Malawi than in, say, Germany, the situation is reversed in the case of investment in telecommunications, which is more essential in countries where economic growth stems from industry, rather than from agriculture.

Although these results are borne out by data, the authors chose not to oversell them. The reasons were twofold. First, they saw the need for more econometric work, in particular, better addressing initial conditions and endogeneity bias. With respect to the latter, the next version of the paper will include results obtained from advanced estimation techniques (SYS-GMM). Secondly, data from developing countries are of considerably lower quality compared with those obtained from, for example, OECD countries. As "noisy" data might influence results in an undesirable direction (i.e., parameter sign) or in terms of estimated parameter magnitudes, a sensitivity analysis will be undertaken.

Nonetheless, the conclusion points squarely to the fact that infrastructure is critical for productivity, industrial development and, ultimately, social advancement.

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Young scholars expert group meeting, *by Thiam Hee Ng*

Presenting their research related to UNIDO's thematic activities, ten young scholars from around the world took part in the first UNIDO expert group meeting specifically organized to capture new thinking on issues affecting the priorities of the Organization. Organized by RST, the gathering was held at Headquarters, from 2 to 3 August 2007.

As well as soliciting fresh views on industry-related research, the meeting was aimed at improving UNIDO staff members' knowledge of the latest research being carried out in leading universities. It also served to identify potential collaborators with whom UNIDO researchers could work in producing cutting-edge research papers on industrial development issues.

Following the opening by Yoshiteru Uramoto, Deputy to the Director-General, Geoffrey Gachino, from Kenya, made a presentation on technological spillovers from multinational presence. He reviewed the existing literature on spillover analyses and proposed a unique analytical framework for examining technological spillovers in a manufacturing industry setting. Maria Teresa Dueñas-Caparas, from the Philippines, examined the factors affecting the export performance of firms in three main manufacturing sectors in her country. She found that among the firm-level characteristics tested, foreign affiliation had the most prominent influence on a firm's propensity to export. The final presenter during the first day's morning session was Simon Baptist, from the United Kingdom. He used micro firm-level panel data to assess how technology and productivity differed across firms in Ghana and the Republic of Korea. Mr. Baptist found that firms in the latter were using more capital- and labour-intensive and less material-intensive technology than that used by firms in the former.

In the afternoon session, Victor Perez Centeno, from Peru, applied a qualitative and ethnographic approach to analyze the networking development process in selected small businesses in the Villa El Salvador industrial park. Based on field observations of six firms in the sectors of metalworking, furniture and footwear, a new model for formation of networks of small businesses was developed. Alessandra Mezzadri, from Italy, then presented an appraisal of the limitations of corporate social responsibility (CSR) in the Delhi export-oriented ready-made garment cluster at the end of the Multi-Fibre Agreement. The rise of CSR in the garment sector in recent years has been phenomenal, and it should have resulted in an improvement in working conditions. In Delhi, however, where informality is still widespread, the structure and organization of the production process led to a failure in the effectiveness of CSR codes.

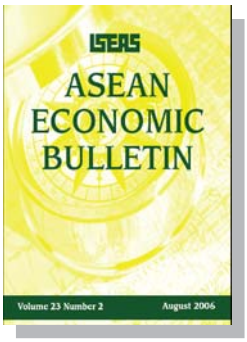
On the meeting's second day, Adeel Malik, from Pakistan, examined the structural determinants of output volatility in developing countries and, in particular, the roles of geography and institutions. He emphasized the importance of market access for developing countries. Remote countries were found to be more likely to have undiversified exports and to experience greater volatility in output growth. Abraham Garcia-Torres, from Spain, then presented a way to quantify national systems of innovation using a composite indicator made up of indicators of human

capital, creation of knowledge, supply-side innovation capacity and demand-side innovation capacity. A novel aspect of his approach was the inclusion of the role of demand in quantifying national systems. In the final presentation of the morning, Markus Eberhardt, from Germany, introduced an empirical specification of a dual economy model to estimate sectoral production functions for agriculture and manufacturing. He found that the production function for agriculture and that for manufacturing were different and, hence, that it might not be appropriate to aggregate both sectors together when doing economy-wide analysis.

The afternoon session began with Tomasz Iwanow, from Poland, quantifying the potential gains in trade performance from implementation of trade facilitation reform measures. While trade facilitation could contribute to improved export performance, he found that improvements in the quality of the regulatory environment, as well as the basic transport and communications infrastructure, were equally, or more, important in facilitating export growth. In the meeting's final presentation, Riham Shendy, from Egypt, examined the effect of tariff reductions on productivity in South Africa. Using industry-level data for the manufacturing sector, she found that lower tariffs helped improve productivity by making imported technology cheaper. She concluded that there seemed to be little effect on productivity from increased foreign competition.

The Research and Statistics Branch will be publishing a compendium of the papers presented at the meeting.

ASEAN Multinational Enterprises: A Structural Model Analysis of Strategic Coherence, *by Frank L. Bartels, Ha Nam Khanh Giao and Tim J. Ohlenburg*



The dynamics of internationalization by multinational enterprises (MNEs) from the Association of Southeast Asian Nations (ASEAN) countries are presented in a new study in the *ASEAN Economic Bulletin* (volume 23, issue number 2, 2006). For the first time, 135 ASEAN MNEs are examined in three dimensions: strategic coherence, dispersed functionality and international management capability.

Today's "global factory" of some 65,000 multinational MNEs and more than 850,000 subsidiaries worldwide constitutes 65-70 per cent of international business and world trade. With their rising share of foreign direct investment (FDI), ASEAN MNEs have become increasingly significant intermediators in the process of shifting FDI patterns and global industrial restructuring.

The authors recognize three major challenges facing MNEs in managing the dispersion of responsibilities and differentiating the tasks of their subsidiaries. The first is setting strategic direction by accurately identifying business objectives. The second is building a differentiated organization by designing diverse roles, distributing assignments appropriately and giving managers the required responsibilities, legitimacy and power. The third is to manage continuously relationships and processes, in order to ensure that multiple roles and distributed responsibilities are coordinated and controlled coherently.

The study conceptualizes a statistical model of strategic coherence for ASEAN MNEs. Based on data collected through 62 multi-item questions, it addresses the issue of how ASEAN MNEs effectively and efficiently control the dispersed functionality and international management capability of their operations as FDI disperses geo-economically and alliance capitalism expands.

The essence of a firm's performance, the study points out, entails managing dynamic resource relationships and complex subsidiary assets so as to achieve organizational goals. Companies need effective controls to integrate efficiently diverse actions of constituents into coherent behaviour. This involves protocols and management systems for data, information and knowledge acquisition, as well as for coordination of managerial processes. The value of communication, command and coordination as integrating mechanisms lies in these controls, reducing uncertainty and ensuring that organizational behaviours are compatible with and support strategy. Strategic coherence is necessary for the

corporate mission of MNEs to be achievable, while detecting, enabling and transmitting coherence are the fundamental tasks of management. A company's strategic coherence, therefore, comprises the dynamic balance of stakeholders' interests, mechanisms of authority and the coordinating price system.

The study indicates the importance of managers continuously configuring sets of objectives within market imperfections. Large MNEs are constantly integrating, and reintegrating, their dispersed activities. Subsidiaries have specialized roles, such as greater market scope but narrower functional and/or product responsibilities. Assigning world product mandates to specific subsidiaries the study sees as a desirable organizational response to the need for specialization.

With their voluminous intra-firm transactions and widespread transfer pricing manipulations, MNEs face a major challenge in designing a transfer pricing system that rewards managers appropriately, without infringing legal and fiscal regulations. The increasing spatiality of joint international business associations has led to highly complex inter-organizational networks linking the majority of large firms in oligopolistic and high-tech industries. With network strategic management constituting an important source of competitive advantage, three major implications arise. First, collaborations should be managed within a portfolio of alliances. Partner selection, therefore, becomes crucial and should entail an analysis of bilateral and multilateral fit of respective contributions. Secondly, networks should leverage knowledge and diffuse it across organizational frontiers. Thirdly, as there is a difference between managing alliances as contracts, or as a set of competences, combining competences in a network is central to this portfolio approach.

The study confirms that dispersed functionality significantly predicts strategic coherence, in that increases in dispersed functionality lead to decreases in strategic coherence. Dispersed functionality and international management capability display a non-recursive, or interdependent, correlation. The implication for international business is that the spatial distribution of a company relatively early in its internationalization determines the extent to which it can project strategic coherence.

While the model used confirms the supposition that the more spread out organizational functions, the less the strategic coherence of the company, it refutes the notion that the greater the international management capability of a company, the greater its strategic coherence. The implication is that ASEAN MNEs, in general, tend strongly to integrate along production value-chains but relatively weakly within networks, despite the prevalence of long-term business relationship networks in home markets. Developing countries hoping to attract FDI from ASEAN firms would benefit from an appreciation of these dynamics within MNEs.

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Statistical metadata and quality assurance in industrial statistics, *by Tetsuo Yamada*

Although the etymology of "metadata" dates only to 1968, this curious term has gained immense significance for the world of statistics in less than four decades. The *Oxford English Dictionary* defines it as a set of data that provides information about other data. Behind this terse description lies a major implication for the quality of statistics, especially in today's age of information technology.

In the era of globalization of the economy, monitoring of industrial development and the empirics of economic growth demand specialized and detailed structural economic industrial statistics, as an indispensable information base. Viable strategies, policies and programmes for sustainable industrial development and investment cannot be formulated unless their preparation is grounded in such statistics and analysis. To support such analysis in the area of production activities as well as to monitor the progress of industrial development worldwide, UNIDO compiles and disseminates key world structural industrial statistics (INDSTAT Database). In addition, it maintains an international database on the relationship between demand and supply, as well as at a detailed level of industry

classification (IDSB Database). Furthermore, for cross-country aggregation, the Organization produces short-term forecasts of manufacturing value added (MVA) at a sub-sectoral level.

Statistical data are meaningful, however, only if they are comparable within each of the specified data dimensions, such as countries, industries and years, as well as relevant and accurate. In this regard, the usefulness of currently available international data on industrial statistics is limited, particularly for least developed countries. To ensure proper use of these databases, much of UNIDO's data-quality assurance work relates to preparation of metadata in support of the statistical data stored in the databases.

The importance of consistent and user-friendly metadata has taken on exponential significance. To cite an instance, data dissemination via the Internet has resulted in increased user expectations concerning data availability, comparability and timeliness. While electronic data dissemination has obvious advantages to both data producers and users, it has resulted in diminishing opportunities for direct and regular interaction between them in regard to the quality and applicability of the data provided.

Under these circumstances, international data producers are expected more than ever to provide users with consistent and internationally comparable data. However, due to a general lack of relevant supplementary information, data quality assurance carried out by international organizations such as UNIDO is often limited to only those dimensions of quality related to improving timeliness, accessibility and international comparability of data, filling data gaps and compilation of data on relevant statistics. Hence, metadata has become particularly crucial in supporting statistical data, in order to put them in an accurate perspective.

Therefore, international organizations' efforts to improve data reported by national statistical offices are, of necessity, confined to three areas:

- Data estimation to increase timeliness and completeness by use of available supplementary information and imputation as well as econometric data estimation
- Screening and adjustment of incoherent or inconsistent data
- Preparation of appropriate statistical background information from the viewpoint of international standards to support an international database that draws on concrete and well-documented metadata from national statistical offices, as primary data compilers

To improve national and, consequently, international data, the development of common standards to ensure cross-country comparability is one of the top priorities for the international statistical community. UNIDO is working actively in the international statistical community for coordination of statistical activities as well as for development and promotion of international statistical classifications, concepts, definitions and data-compilation and -dissemination methodologies. For instance, UNIDO has been cooperating directly with the United Nations Statistics Division in the preparation of two UN standard manuals for industrial statistics to be used by national statistical offices.

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